

CLAIMS

1. A flat lamp (1) comprising at least two glass substrates (2, 3) kept mutually parallel and defined in an internal gas-filled space (10), comprising two electrodes (4, 5) associated with the glass substrates and away from the internal space (10), in which the internal face (22, 32) of at least one substrate (2, 3) turned toward said internal space (10) is coated with a phosphor material (6, 7), **characterized in that** at least one of the electrodes (4, 5) is covered with at least one preferably transparent electrical insulation (2, 3; 14, 15; 16, 17) that may be formed by at least one of the glass substrates (2, 3) or be associated with at least one of the glass substrates (2, 3).

2. The lamp as claimed in claim 1, **characterized in that** at least one electrode is affixed to the surface of the external face (21, 31) of the substrate with which it is associated and is covered with at least one electrical insulation (2, 3; 14, 15; 16, 17), the electrode being incorporated into the surface of the glass substrate or of the electrical insulation.

3. The lamp as claimed in claim 1, **characterized in that** at least one electrode is incorporated into the electrical insulating material (2, 3; 14, 15), either within its very thickness or on the surface.

4. The lamp as claimed in claim 2 or 3, **characterized in that** the electrical insulation is made of glass or of a transparent plastic such as polyvinyl butyral (PVB), ethylene/vinyl acetate (EVA) or polyethylene terephthalate (PET).

5. The flat lamp as claimed in any one of the preceding claims, **characterized in that** the electrical insulation (2, 3; 14, 15) associated with the electrode is assembled with one or more other additional,

preferably transparent electrical insulations (16, 17) made of glass or of any other material, such as a plastic.

5 6. The lamp as claimed in claims 2 and 5, **characterized in that** at least one additional electrical insulation (16, 17) is formed by another glass substrate that is laminated to at least one glass substrate (2, 3) via an intermediate plastic film or  
10 other material, especially a resin, that can make the two substrates adhere to each other.

7. The lamp as claimed in any one of the preceding claims, **characterized in that** at least one electrical  
15 insulation (2, 3; 14, 15; 16, 17) constitutes a sheet exhibiting an optical effect, especially one that is colored, decorated, structured, diffusing, etc.

8. The lamp as claimed in any one of the preceding  
20 claims, **characterized in that** the electrodes (4, 5) are continuous, conducting and transparent coatings, each located on the external face (21, 31) side of a substrate (2, 3) and covering at least part of the facing surfaces of said substrates.

25 9. The lamp as claimed in claim 8, **characterized in that** the electrodes (4, 5) cover all of the external faces (21, 31) of the glass substrates.

30 10. The lamp as claimed in claim 8 or 9, **characterized in that** the continuous coatings (4, 5) may be in the form of an array of parallel bands, having a bandwidth of between 3 and 15 mm, and a non-conducting space between two adjacent bands, having a width greater than  
35 the width of the bands, these coatings deposited on the two substrates being offset by 180° so as to prevent two opposed conducting bands of the two substrates from facing each other.

11. The lamp as claimed in any one of the preceding claims, **characterized in that** the electrodes (4, 5) are formed from a metal oxide having electronic vacancies, such as fluorine-doped tin oxide or mixed indium tin oxide.

12. The flat lamp as claimed in any one of claims 1 to 7, **characterized in that** an electrode (4, 5) is an integrated metal grid, where appropriate inserted in between two plastic sheets, or the electrode is in the form of a layer deposited on and incorporated into a plastic film.

13. The lamp as claimed in any one of the preceding claims, **characterized in that** at least part of the internal face (22, 32) of at least one of the two substrates (2, 3) is coated with a phosphor material (6, 7).

14. The lamp as claimed in any one of the preceding claims, **characterized in that** the phosphor is selected in order to determine the color of the illumination.

15. The lamp as claimed in any one of the preceding claims, **characterized in that** spacers (9), made of a non-conducting material, are placed between the two glass substrates (2, 3) said spacers maintaining the separation between the two substrates.

16. The lamp as claimed in claim 15, **characterized in that** the separation between the two substrates is around 0.3 to 5 mm.

17. The lamp as claimed in either of claims 15 and 16, **characterized in that** the spacers (9) are made of glass.

18. The lamp as claimed in one of claims 15 to 17, **characterized in that** the lateral surface of the spacers (9) is coated with a phosphor material.

5 19. The lamp as claimed in any one of the preceding claims, **characterized in that** the gas pressure in the internal space (10) is around 0.05 to 1 bar.

10 20. The lamp as claimed in any one of the preceding claims, **characterized in that** one of the glass substrates (2) has at least one hole (12) drilled through its thickness and obstructed by a sealing means (13).

15 21. The lamp as claimed in any one of the preceding claims, **characterized in that** the contour of the glass substrates (2, 3) is polygonal, concave or convex, or curved with a constant or variable radius of curvature.

20 22. The lamp as claimed in any one of the preceding claims, **characterized in that** it has two illuminating faces.

25 23. A process for manufacturing a lamp as claimed in any one of the preceding claims, comprising the steps in which:

- optionally, at least one electrode is deposited on one of the glass substrates;

- the phosphor is screen-printed on at least one  
30 of the glass substrates, one of which is provided with a hole drilled through its thickness and on the opposite side from the electrode if the latter is deposited on the same substrate;

- spacers are deposited on one of the glass  
35 substrates;

- the glass substrates are joined together so as to be parallel;

- the internal space is sealed by means of a peripheral sealing material;

- the atmosphere contained in the internal space is replaced, via the hole, with the plasma gas; and
  - the hole is obstructed by a sealing means;
  - optionally, at least one first electrical
- 5 insulation is joined to at least one glass substrate, the electrical insulation being intended to cover or to incorporate, internally or on the surface, the electrode with which one of the faces of said substrate has to be associated, or intended to cover the
- 10 electrode that is associated with a second electrical insulation that is joined to the first electrical insulation.

24. The application of a lamp as claimed in any one of

15 claims 1 to 22 to the production of architectural or decorative elements that illuminate and/or have a display function, such as flat luminaires, illuminating walls, especially suspended walls, illuminating tiles, etc.